

7.22

**STANDARD OPERATING PROCEDURES  
FOR THE COLLECTION AND PRESERVATION  
OF LAKE OR NON-WADEABLE WETLAND WATER SAMPLES  
USING 6-FOOT DEPTH INTEGRATED COLUMN SAMPLER  
FOR CHEMICAL ANALYSIS**

**Summary**

Lake water quality samples collected with a 6-foot depth integrated column samples are to represent the average photic zone or most productive zone of a North Dakota lake or wetland. To be representative of the lake or wetland samples must be carefully collected, properly preserved, and appropriately analyzed. In general, the collection should take place from the central deep area of the lake or wetland. If sampling a reservoir the sample should be collected over the deepest zone but far enough back from the dam face to still represent the majority of the lake.

**Equipment and Supplies**

- ☐ Two-inch diameter 6-foot depth integrated column collector.
- ☐ Two gallon churn splitter.
- ☐ Sample containers.
- ☐ Acid for sample preservation.
- ☐ Tape to hold labels on bottles.
- ☐ Cooler with ice or frozen gel packs.
- ☐ Deionized water for sample blanks and decontamination.
- ☐ Filter apparatus.
- ☐ For vacuum method.
  - Vacuum filter holder.
  - Vacuum pump.
  - 0.45 µm membrane filters (Millipore HAWP 047 00 or equivalent).
  - Pre-filters (Millipore AP40 0047 05 or equivalent).
  - Stainless steel forceps.
- ☐ For peristaltic method.
  - Power Drive (Compact Cat No. P-07533-50 or equivalent)
  - Peristaltic head (Easy Load II Cat No. P-77200-62 or equivalent).
  - Inline 0.45 µm cartridge filters (Geotech dispos-a-filter or equivalent).
  - Inline 5.0 µm cartridge pre-filters (Geotech dispos-a-filter or equivalent).
  - Tubing (Masterflex silicone Cat No. P-96400-24 or equivalent).
  - Churn Splitter.
- ☐ Field report form (Figure 7.22.1).
- ☐ Sample ID/Custody Record (Figure 7.22.2).
- ☐ Field sample log forms (Figure 7.22.3).
- ☐ Sample labels (Figure 7.22.4)
- ☐ Ballpoint pen “Black” or pencil.

### **Water Quality Sample Collection Procedure**

1. Rinse the 6-foot depth integrated column collector, churn splitter, and sample containers with lake water.
2. Collect a depth integrated water column sample by first removing the cap and then carefully immersing the sampler to fill with an undisturbed column. Replace cap and rapidly invert the sampler effectively capturing the column.
3. Pour the contents of the sampler into the churn splitter. Note: If the sample was collected properly, the sample volume should be approximately 1 gallon.
4. Repeat 1 through 3 until churn splitter is full.

### **Field Bottle Blank Sample Collection**

1. Field bottle blank samples are collected with the first sample and every tenth sample (i.e., 1, 10, 20...).
2. Triple rinse each sample bottle using deionized water.
3. Fill each bottle with deionized water.
4. Preserve each sample appropriately. Note: Do not preserve the total dissolved phosphorus sample until after filtering.
5. Place a label on each sample container (Figure 7.22.4). Note: Field bottle blanks should be identified with STORET number 389990. Be sure to indicate on the label the lake name, associated site identification number and the depth of the sample being duplicated.
6. Place the sample in a cooler on ice.

### **Field Duplicate Sample Collection**

1. Field duplicates are collected on the first sample and every tenth sample (i.e., 1, 10, 20....). If the sample log indicates a duplicate should be collected, follow the steps below.
2. Collect the sample following step (2) in the procedure for Field Sample Collection.
3. Place a label on each sample container (Figure 7.22.4). Note: Field sample duplicates should be identified with STORET number 389999. Be sure to indicate on the label the lake name, associated site identification number and the depth of the sample being duplicated.

4. Place the samples in a cooler on ice.

#### **Field Sample Filtration Vacuum Method**

1. Unpreserved total dissolved phosphorus samples should be filtered immediately.
2. Remove filter holder from the plastic bag and assemble.
3. Put on latex gloves
4. Rinse the filter apparatus three times with approximately 250 ml of deionized water each time.
5. Load a pre-filter in the filter apparatus and connect the vacuum pump.
6. Leach the filter twice with approximately 250 ml of deionized water.
7. Filter the sample through the pre-filter. Place the sample back into the sample container.
8. Remove the pre-filter from the filter apparatus and repeat step 4.
9. Load a 0.45  $\mu\text{m}$  filter into the filter apparatus and connect the vacuum pump.
10. Repeat step 6.
11. Filter the sample through the 0.45  $\mu\text{m}$  filter.
12. Triple rinse the sample container with deionized water.
13. Transfer the filtered sample back into the sample container.
14. Preserve the sample with 2 ml 1/5 sulfuric acid lowering the pH to 2 or less.
15. Place the preserved sample in the cooler on ice.
16. If additional samples require filtration, repeat steps 3 through 15.

#### **Field Sample Filtration Peristaltic Method**

1. Peristaltic filtration method is used to collect dissolved nutrient(s), dissolved mineral(s) and dissolved metal(s). The dissolved nutrient and/or dissolved mineral and metal samples should be filtered and preserved immediately upon reaching shore.

2. Rinse a churn splitter three (3) times with water from the sampling depth.
3. Fill churn splitter with water from the appropriate depth. Note: This often requires taking a 500 or 1000 ml bottle along and filling and emptying it into the churn splitter multiple time until full.
4. Assemble and attach pump head to power drive.
5. Plug in power drive.
6. Put on latex gloves.
7. Remove acid rinsed tubing from plastic bag, taking care to prevent contamination and place in head draping a long end into the churn splitter and dangling the short end out of contact with anything.
8. Turn on pump and rinse tubing with a minimum of 250 ml of sample water from churn splitter.
9. As tubing rinses remove cartridge filter from plastic bag and insert cartridge while pump is still running. Care should be taken to ensure filter cartridge is inserted in the correct direction.
10. Run 250 ml of sample water through cartridge filter.
11. Place labels on bottles.
12. Triple rinse the sample bottles and lids with sample water coming out of the filter cartridge.
13. Fill sample bottles.
14. Preserve nutrient sample with 2 ml 1/5 sulfuric acid and ICP Metals or Trace metals with 2 ml concentrated nitric acid lowering the pH to 2 or less.
15. Place samples in the cooler on ice.
16. If cartridge becomes plugged, repeat steps 6 through 15 with an in-line 2.0  $\mu\text{m}$  pre-filter placed between the pump and the in-line prior to the 0.45  $\mu\text{m}$  filter.

[illegible]

**Figure 7.22.1** Water Quality Field Log.



**North Dakota Department of Health  
Sample Identification Record  
Division of Laboratory Services—Chemistry  
Telephone: 701.328.6140  
Fax: 701.328.6280**

<b>For Laboratory Use Only</b>	
Lab ID:	
Preservation: Yes <input type="checkbox"/>	Temperature:
Initials:	

**Surface Water Sample Identification Code R (Water samples)**

Samples received without this sheet or without all necessary sections fully completed will be rejected and not analyzed.

**Sample Collection/Billing Information**

Account #	Project Code:	Project Description:	
Customer (Name, Address, Phone): SWQMP, Division of Water Quality, Gold Seal Center, 4 <sup>th</sup> Floor			
Date Collected:	Time Collected:	Matrix: Water	Site ID:
Site Description:			
Alternate ID:		Collected By:	
County Number:	County Name:		
Comment:			
Comment:			

**Field Information/Measurements**

Sample Collection Method (Circle One): Grab <input type="checkbox"/> DI* <input type="checkbox"/> DWI** <input type="checkbox"/> 0-2 meter column <input type="checkbox"/>		Depth:	Units:	Discharge:	Stage:
Conductivity:	pH:	Temp:	Dissolved O <sub>2</sub>	Turbidity:	
Comment:					

**Analysis Requested**

<input type="checkbox"/> 5) SW-Major Cations/Anions	<input type="checkbox"/> 74) SW-PAHs	<input type="checkbox"/> 33120) SW-E. coli	
<input type="checkbox"/> 7) SW-Trace Metals	<input type="checkbox"/> 84) SW-PCBs	<input type="checkbox"/> SW-TOC	
<input type="checkbox"/> 21) SW-Carbamates	<input type="checkbox"/> 105) SW-Chlorophyll-a & b Filtered: _____ mL	<input type="checkbox"/> SW-DOC	
<input type="checkbox"/> 23) SW-Acid Herbicides	<input type="checkbox"/> 118) SW-TSS	<input type="checkbox"/> SW-C-BOD-5day	
<input type="checkbox"/> 25) SW-Base/Neut. Pest	<input type="checkbox"/> 144) SW-Trace Metals-dissolved	Other:	
<input type="checkbox"/> 30) SW-Nutrients, Complete	<input type="checkbox"/> 160) SW-Nutrients, Complete-dis		
<input type="checkbox"/> 50) SW-Nutrients, Total P-dis.	<input type="checkbox"/> 33080) SW-Fecal coliform bacteria		

**Figure 7.22.2** Sample Identification/Custody form. \* Depth Integrated \*\* Depth/Width Integrated



**North Dakota Department of Health**  
**Division of Water Quality**  
**Lake and Wetland Profile Field Log**  
**Telephone: 701.328.5210**  
**Fax: 701.328.5200**

<b>Project Code:</b>		<b>Project Name:</b>	
<b>Site Identification:</b>		<b>Site Description:</b>	
<b>Date:</b> /     /	<b>Time:</b> :	<b>Ambient Temp:</b>	<b>Wind Speed:</b>
<b>Wind Direction:</b>	<b>%Cloud Cover:</b>	<b>Secchi Disk:</b> (m)	<b>Baro:</b> (mm/Hg)
<b>Chlorophyll-a:</b>	<b>Phytoplankton:</b>	<b>Initial DO:</b>	<b>Final DO:</b>
<b>Sample Depths:</b> Meters             Meters		<b>Meters             Meters</b>	
<b>Sampler(s):</b>			
<b>Comments:</b>			

Depth (m)	Temp (c)	DO (Mg/L)	pH	Specific Conduct.	Comments

**Figure 7.22.3** Lake and wetland field log.

<b>Project Code</b>	<b>Project Description</b>
<b>Sample ID</b>	<b>Site Description</b>
<b>Analysis: (DC Code) SW-Analyte Group</b>	
<b>Container:</b>	<b>Preservative:</b>
<b>Date: _/_/_</b>	<b>Time: _:</b> <b>Depth:</b>
<b>Sampler</b>	

<b>Project Code</b>	<b>Project Description</b>
<b>389990</b>	<b>Sample Blank</b>
<b>Analysis: (DC Code) SW-Analyte Group</b>	
<b>Container:</b>	<b>Preservative:</b>
<b>Date: _/_/_</b>	<b>Time: _:</b> <b>Depth:</b>
<b>Sampler</b>	

<b>Project Code</b>	<b>Project Description</b>
<b>389999</b>	<b>Sample Duplicate</b>
<b>Analysis: (DC Code) SW-Analyte Group</b>	
<b>Container:</b>	<b>Preservative:</b>
<b>Date: _/_/_</b>	<b>Time: _:</b> <b>Depth:</b>
<b>Sampler</b>	

**Figure 7.22.4.**  
Label, Water Chemistry Blank Label, and Water Chemistry Duplicate Label.

SWQMP Water Chemistry